

CORRES CONTROL
INCOMING LTR NO

0178 RF 94

DUE
DATE

ACTION

DIST. LTR ENC

BENEDETTI, R L		
BENJAMIN, A		
BERMAN, H S		
CARNIVAL, G J		
COPP, R D		
CORDOVA, R C		
DAVIS, J G		
FERRERA, D W		
FRANZ, W A		
HANNI, B J		
HEALY, T J		
HEDAH, T G	X	X
HILBIG, J G		
HUTCHINS, N M		
KIRBY, W A		
KUESTER, A W		
MAHAFFEY, J W		
MANN, H P		
MARX, G E		
McKENNA, F G		
MORGAN, R V		
PIZZUTO, V M		
POTTER, G L	X	X
SANDLIN, N B		
SATTERWHITE, D G		
SCHUBERT, A L		
SETLOCK, G H		
SULLIVAN, M T		
SWANSON, E R		
WILKINSON, R B		
WILSON, J M		

Stiger S X X

CORRES CONTROL x x
PATS/T130G
ADMIN RECORD 080 X 2

Reviewed for Addressee
Corres Control RFP

1-12-94
DATE BY

Ref Ltr #

DOE ORDER # 5400 1

RF 46522 (Rev 9/93)

Department of Energy

ROCKY FLATS OFFICE
P O BOX 928
GOLDEN COLORADO 80402 0928

JAN 12 9 11 AM '94

JAN 11 1994

EG&G
ROCKY FLATS FIELD
OFFICE

94-DOE-00624



000021166

Dr Frederick R Dowsett, Chief
Monitoring and Enforcement
Hazardous Waste Control Program
Colorado Department of Health
4300 Cherry Creek Drive South
Denver, Colorado 80222-1530

Dear Dr Dowsett

The Department of Energy has received your letter dated December 29, 1993, that refers to the Resource Conservation and Recovery Act Contingency Plan Implementation Report No 93-010. You have requested a written explanation as to the non-removal of soil on which approximately ten gallons of Operable Unit (OU) No 2 contaminated water was spilled.

Table 1, which was attached to the report referred to above, only included data for one collection point in OU-2. Three collection points flow into the water treatment pipeline to be treated in the OU-2 Field Treatability Unit (FTU). The spill occurred along the pipeline. Two of the three collection points do not contain significant analytes above ARARs. EG&G is working with Joe Schieffelin from the Colorado Department of Health to remove these two collection points from the required water treatment system. The one contaminated collection point flows at one gallon per minute (GPM), with the total flow of all three at forty GPM.

Enclosed is a list (Enclosure A) of the analytes for which ARARs have been established for the OU-2 Surface Water FTU. The table shows the averaged data from two sampling events from the combined water collection location, RS-2. The combined surface water influent to the FTU is not contaminated with respect to ARARs, with the exception of tetrachloroethene and zinc.

Due to the two analytes being above ARARs, a risk analysis was performed using the data from Enclosure A, and used approved EPA methodology. This analysis is enclosed (Enclosure B), and indicates that the risk falls within the allowable limits of 10^{-4} and 10^{-6} . Removal of the affected soil therefore is not required.

Sincerely,

Martin H McBride
Acting Assistant Manager for
Environmental Restoration

Enclosure

ADMIN RECORD

BZ -A-00103

JAN 1 1 1994

F Dowsett
94-DOE-00624

2

cc w/Enclosure
D Ruscitto, AMOWM, RFO
V Witherill, ER, RFO
T Lukow, WPD, RFO
J Leifer, WOB, RFO
G Potter, EG&G
K Alstatt, CDH

ATTACHMENT A

<u>ANALYTE</u>	<u>ARARs</u>	<u>CONC'N AT RS-2</u>	<u>UNITS</u>
1,1-DICHLOROETHENE	7	ND	µg/l
CHLOROFORM	1	0 7	µg/l
CARBON TETRACHLORIDE	5	3 0	µg/l
TETRACHLOROETHENE	1	2 0	µg/l
TRICHLOROETHENE	5	3 0	µg/l
VINYL CHLORIDE	2	ND	µg/l
ALUMINUM	240	21 65	µg/l
ARSENIC	50	1 00•	µg/l
BARIUM	1000	153 00	µg/l
BERYLLIUM	100	1 00•	µg/l
CADMIUM	5	3 00•	µg/l
CHROMIUM	10	4 00•	µg/l
COPPER	25	2 00•	µg/l
IRON	1000	140 95	µg/l
LEAD	5	1 00•	µg/l
MANGANESE	1000	31 00	µg/l
MERCURY	0 2	0 20•	µg/l
NICKEL	40	6 00•	µg/l
SELENIUM	10	2 65	µg/l
ZINC	50	80 1	µg/l

ND Non-detection
 • Value shown is at detection limit

HUMAN HEALTH RISK ASSESSMENT OU 2 TREATABILITY WATER SPILL

SUMMARY

This human health risk assessment was performed to ascertain the human health risks posed by the water in the water in the OU 2 treatability system. The results of this risk assessment show that

- The carcinogenic risk of a residential receptor drinking the OU 2 treatability water for 30 years is 6.2×10^{-6} which is well within the Environmental Protection Agency (EPA) acceptable risk range of 10^{-4} to 10^{-6} .
- The non-carcinogenic hazard quotient of the same receptor is 0.15 which is less than 20% of the EPA's acceptable hazard quotient of 1.

These findings show that the water in the OU 2 treatability system pose an acceptable human health risk.

RISK ASSESSMENT METHODOLOGY

To perform the risk assessment, accepted methodologies outlined in Risk Assessment Guidance For Superfund, Volume I, Human Health Evaluation Manual (Part A) were used. The bounding risk assessment exposure scenario was chosen to be a person living near to the OU 2 treatability unit. It was projected that this person would drink only water from the OU 2 unit for 350 days/year over 30 years. This person will drink 2 liters/day. These parameter values are defined by the Environmental Protection Agency (EPA) as Reasonable Maximum Exposure (RME) values and are sanctioned for use by the EPA. This scenario is extremely conservative since

- The likelihood of a residence being constructed on OU 2 is quite small. The source of chemicals in the environment are located on and at the bottom of a slope. This area is not conducive to residential development (i.e., it consists of both small wetland areas and sloped terrain). In addition, future land use of the Rocky Flats Plant (RFP) in the currently developed portions of the facility is anticipated as industrial use. If there were to be residential construction on the RFP, it would likely be at some distance from the industrialized areas, rather than directly adjacent to them.
- Because sufficient amounts of potable water from a municipal water supply would likely be available if the area were developed, it is probable that a future resident would utilize this more dependable and more readily available source of water.
- It is assumed that the surface water from OU 2 is not augmented by other drinking supplies. This assumption does not take into account fluid intake from other sources (i.e., bottled drinks, other drinking water sources, etc.).
- The risk assessment assumes no treatment of the water prior to consumption. Typical treatment for surface water supplies consist of filtering and chlorination. Activated carbon units to adsorb organics are also in use.

The first step in evaluating the human health risks after deciding upon the exposure scenario is to calculate an intake factor. This factor is calculated separately for carcinogenic and non-carcinogenic effects. This factor takes into account all constant parameters within the exposure scenario and are outlined in Attachment I. The intake factor for carcinogenic effects is calculated to be 1.17×10^{-2} (Liter/(Kg-Day)). The intake factor for non-carcinogenic effects is calculated to be 2.74×10^{-2} (Liter/(Kg-Day)).

In order to calculate human health risk, site-specific and chemical-specific parameters must be known. The first site-specific values needed are the chemicals and metals deemed to be contaminants at the site. For this risk assessment, a list of organics and metals detected at sampling point RS-2 in May, 1993 for the OU 2 treatability system were provided. All detected organics were used in the risk assessment, and these were Carbon Tetrachloride, Chloroform, 1,1-Dichloroethane, Cis-1,2-Dichloroethene, Tetrachloroethene, Toluene and Trichloroethene. Water concentrations for these organics are outlined in Attachment II and Attachment III.

Since there are naturally occurring metals in surface water, a background comparison was performed to assure that metals used in the risk assessment were actually above background. Before performing this background comparison though, the standard practice of eliminating the essential nutrients magnesium, potassium, sodium, calcium and iron was performed. Since there was a limited data set (e.g., there were no more than two detects for any metal), an Upper Tolerance Limit (UTL) comparison was performed as outlined in the Background Geochemical Characterization Report, dated September 30, 1993. The UTL_{99/99} was used from the background report for surface water and spring/seeps. This comparison showed that there were no metals above background.

Chemical-specific oral slope factors and reference doses are required to calculate carcinogenic and non-carcinogenic effects respectively. A search was performed in the Integrated Risk Information System (IRIS) on 1/6/94 for all detected organics. IRIS was used as the primary source for slope factors and reference doses. The 1993 annual update to the Health Effects Assessment Summary Tables (HEAST) was used as the secondary source. All oral slope factors and reference doses are delineated in Attachment II and Attachment III, respectively. If a detected organic did not have an oral slope factor in either IRIS or HEAST, it is not listed on Attachment II since carcinogenic risk could not be calculated. The oral slope factors for tetrachloroethene and trichloroethene were from Joan S. Dollarhide, Superfund Health Risk Technical Support Center, "Carcinogenicity Characterization of Perchloroethylene (PERC) and Trichloroethylene (TCE)" (Luke Air Force Base, Arizona). If a detected organic did not have an oral reference dose in either IRIS or HEAST, it is not listed on Attachment III since a non-carcinogenic hazard quotient could not be calculated.

The carcinogenic risk calculations are outlined in Attachment II. The carcinogenic intake factor, organic concentration in water and oral slope factor are multiplied together to calculate the chemical-specific carcinogenic risk. All chemical-specific risks are then summed to get an overall carcinogenic risk.

The non-carcinogenic hazard quotient calculations are outlined in Attachment III. The non-carcinogenic intake factor and organic concentration in water are multiplied together and then divided by the oral reference dose. This will give chemical-specific hazard quotients. All chemical specific hazard quotients are then summed to get an overall non-carcinogenic hazard quotient (Hazard Index).

RESULTS

The carcinogenic risk of a residential receptor drinking the OU 2 treatability water for 30 years is 6.2×10^{-6} which is well within the EPA acceptable risk range of 10^{-4} to 10^{-6} . The non-carcinogenic hazard quotient of the same receptor is 0.15 which is less than 20% of the EPA's acceptable hazard quotient of 1.

The above findings show that the water in the OU 2 treatability system pose an acceptable human health risk.

INTAKE FACTOR EVALUATION

ATTACHMENT I

SCENARIO DEFINITION		
SCENARIO DESCRIPTION	RESIDENTIAL RECEPTOR DRINKS ONLY RAW OU 2 WATER FOR 30 YEARS	
RECEPTOR TYPE	RESIDENTIAL	
RECEPTOR PATHWAY	WATER INGESTION	

PARAMETER DEFINITION		
INTAKE FACTOR =	$\frac{(IR \times EF \times ED)}{(BW \times AT)}$	
ABBREVIATION	DESCRIPTION	VALUE
IR	INGESTION RATE	2 LITER/DAY
EF	EXPOSURE FREQUENCY	350 DAYS/YR
ED	EXPOSURE DURATION	30 YEARS
BW	BODY WEIGHT	70 KG
AT1	AVERAGING TIME (NON CARCINOGENIC)	10950 DAYS
AT2	AVERAGING TIME (CARCINOGENIC)	25550 DAYS

INTAKE FACTOR CALCULATION		
CARCINOGENIC REASONABLE MAXIMUM EXPOSURE		
INTAKE FACTOR =	1.17E-02 LITER/(KG DAY)	
NON-CARCINOGENIC REASONABLE MAXIMUM EXPOSURE		
INTAKE FACTOR =	2.74E-02 LITER/(KG DAY)	

CARCINOGENIC RISK EVALUATION

ATTACHMENT II

SCENARIO DEFINITION					
SCENARIO DESCRIPTION	RESIDENTIAL RECEPTOR DRINKS RAW OU 2 WATER FOR 30 YEARS				
RECEPTOR TYPE	RESIDENTIAL				
RECEPTOR PATHWAY	WATER INGESTION				
PARAMETER DEFINITION					
CARCINOGENIC RISK =	(CIF x WC x SF x CF)				
ABBREVIATION	DESCRIPTION	UNITS			
CIF	CARCINOGENIC INTAKE FACTOR	LITER\KG-DAY)			
WC	WATER CONCENTRATION	UG\LITER			
SF	ORAL SLOPE FACTOR	((MG)\(KG-DAY)) ⁻¹			
CF	CONVERSION FACTOR	MG\UG			
CARCINOGENIC RISK CALCULATION					
CHEMICAL	CIF	WC	SF	CF	CARCINOGENIC RISK
CHLOROFORM	1 17E 02	7 00E 01	6 10E 03	1 00E 03	5 00E 08
CARBON TETRACHLORIDE	1 17E 02	3 00E +00	1 30E 01	1 00E-03	4 56E 06
TETRACHLOROETHENE	1 17E 02	2 00E -00	5 20E 02	1 00E-03	1 22E-06
TRICHLOROETHENE	1 17E 02	3 00E +00	1 10E 02	1 00E-03	3 86E 07
TOTAL					6 22E-06

NON-CARCINOGENIC EVALUATION

ATTACHMENT III

SCENARIO DEFINITION

SCENARIO DESCRIPTION	RESIDENTIAL RECEPTOR DRINKS RAW OU 2 WATER FOR 30 YEARS
RECEPTOR TYPE	RESIDENTIAL
RECEPTOR PATHWAY	WATER INGESTION

PARAMETER DEFINITION

NON-CARCINOGENIC HAZARD QUOTIENT (HQ) = $(NCIF \times MC \times CF)/(RFD)$

ABB	DESCRIPTION	UNITS
NCIF	NON CARCINOGENIC INTAKE FACTOR	LITER\KG DAY)
WC	WATER CONCENTRATION	UG\LITER
CF	CONVERSION FACTOR	MG\UG
RFD	REFERENCE DOSE	(MG\KG-DAY))

CARCINOGENIC RISK CALCULATION

CHEMICAL	NCIF	WC	CF	RFD	HQ
CARBON TETRACHLORIDE	2 74E 02	3 00E+00	1 00E 03	7 00E 04	1 17E 01
CHLOROFORM	2 74E 02	7 00E 01	1 00E 03	1 00E 02	1 92E 03
1 1-DICHLOROETHANE	2 74E-02	8 00E 01	1 00E 03	1 00E 01	2 19E 04
CIS 1,2 DICHLOROETHENE	2 74E 02	9 00E+00	1 00E 03	1 00E 02	2 47E 02
TETRACHLOROETHENE	2 74E 02	2 00E+00	1 00E 03	1 00E 02	5 48E 03
TOLUENE	2 74E 02	4 00E 01	1 00E 03	2 00E-01	5 48E 05
				TOTAL	1 50E 01